CLAIMS

I claim:

1. A method of amplifying a target nucleic acid sequence, the method comprising:

(a) replicating a terminal repeat circle by rolling circle replication primed by a rolling circle replication primer to form an artificial long terminal repeat,

(b) ligating the artificial long terminal repeat to the ends of a target nucleic acid sequence to form an artificial long terminal repeat vector,

(c) amplifying the artificial long terminal repeat vector by strand displacement replication primed by one or more strand displacement primers,

wherein the target nucleic acid sequence is amplified.

2. The method of claim 1 wherein the amplification of the artificial long terminal repeat vector is primed by a single strand displacement primer.

3. A method of amplifying a target nucleic acid sequence, the method comprising:

(a) ligating artificial long terminal repeats to the ends of a target nucleic acid sequence to form an artificial long terminal repeat vector,

(b) amplifying the artificial long terminal repeat vector by strand displacement replication primed by one or more strand displacement primers,

wherein the target nucleic acid sequence is amplified.

4. The method of claim 3 wherein the amplification of the artificial long terminal repeat vector is primed by a single strand displacement primer.

5. The method of claim 3 wherein the amplification is performed under substantially isothermic conditions.

6. The method of claim 3 wherein the amplification does not involve thermal cycling.

7. The method of claim 3 wherein step (b) does not include thermal cycling.

8. The method of claim 3 wherein the artificial long terminal repeats each have at least five repeat units.

9. The method of claim 7 wherein the artificial long terminal repeats each have at least 25 repeat units.

10. The method of claim 3 wherein the artificial long terminal repeat is produced by replicating a terminal repeat circle by rolling circle replication primed by a rolling circle replication primer.

11. The method of claim 10 wherein the artificial long terminal repeat is made double-stranded by performing the rolling circle replication in the presence of helicase, primase, ligase, and single-stranded DNA binding protein.

12. The method of claim 10 wherein the artificial long terminal repeat is made double-stranded by ligating together oligonucleotides hybridized to the artificial long terminal repeat strand made during the rolling circle replication.

13. A method of amplifying nucleic acid molecules, the method comprising:

(a) digesting a nucleic acid sample with a type II restriction endonuclease having an interrupted palindrome recognition sequence or a type IIS restriction enzyme to produce nucleic acid molecules with cohesive ends,

(b) ligating artificial long terminal repeats to the ends of the nucleic acid molecules to form artificial long terminal repeat vectors,

(c) amplifying the artificial long terminal repeat vectors by strand displacement replication primed by one or more strand displacement primers,

wherein the nucleic acid molecule is amplified.

14. The method of claim 13 wherein the amplification of the artificial long terminal repeat vector is primed by a single strand displacement primer.

15. The method of claim 13 wherein a set of artificial long terminal repeats is used in step (b), wherein each member of the set has a different cohesive end, and wherein the cohesive ends of the members of the set collectively include complements to all possible cohesive ends that can be generated by cleavage with the restriction endonuclease,

wherein the artificial long terminal repeat ligated on each end of the nucleic acid molecules depends on the sequences of the cohesive ends of each nucleic acid molecule.

16. The method of claim 15 wherein step (b) is performed as multiple separate reactions where each reaction has a different pair of artificial long terminal repeats.

17. The method of claim 13 wherein the nucleic acid sample is a sample of genomic nucleic acid.

18. A method of amplifying a target nucleic acid sequence, the method comprising:

(a) ligation of multiple identical repeat units to form an artificial long terminal repeat,

(b) ligating the artificial long terminal repeat to the ends of a target nucleic acid sequence to form an artificial long terminal repeat vector,

(c) amplifying the artificial long terminal repeat vector by strand displacement replication primed by one or more strand displacement primers,

wherein the target nucleic acid sequence is amplified.

19. The method of claim 18 wherein the amplification of the artificial long terminal repeat vector is primed by a single strand displacement primer.

20. A kit for amplifying a target nucleic acid sequence, the kit comprising

an artificial long terminal repeat, wherein the artificial long terminal repeat comprises tandem repeat units and a tail sequence at one end, and

a strand displacement primer, wherein the strand displacement primer is complementary to a sequence in, or straddling, the repeat units.

21. The kit of claim 20 further comprising a strand displacing DNA polymerase or a DNA polymerase and a compatible strand displacement factor.

22. A kit for amplifying a target nucleic acid sequence, the kit comprising

a repeat circle, wherein the repeat circle is a single-stranded circular DNA molecule,

a rolling circle replication primer comprising a sequence complementary to a sequence in the repeat circle, and a tail sequence, and

a strand displacement primer, wherein the strand displacement primer is complementary to a sequence in, or straddling, the repeat units.

23. The kit of claim 22 further comprising a strand displacing DNA polymerase or a DNA polymerase and a compatible strand displacement factor.

24. The kit of claim 23 further comprising helicase, primase, ligase, and single-stranded DNA binding protein.

25. The kit of claim 23 further comprising ligase and linear oligonucleotides matching the sequence of the repeat circle.